Use of LIDAR (Light Detection and Ranging) to Monitor Stream Morphology Due to Urbanization of a Suburban Watershed

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Urbanization has been associated with changes in stream flow regime, morphology, and water quality of rural watersheds being developed. Most studies of the effect of urbanization on stream morphology have been done *post hoc* - after development has occurred - and involve the extrapolation of limited stream transects (across-channel topography measurements) to monitor measure changes in stream morphology.

We are using LIDAR imagery to construct a high-resolution, three-dimensional model of the topography of a small suburban watershed north of the Washington D.C. metropolitan area. This watershed is in the early stages of urbanization and LIDAR was obtained using a small aircraft to acquire the imagery during early winter (no snow and leaf-off) conditions. This imagery will be used to construct a baseline (pre-development) three-dimensional stream channel model. Subsequent LIDAR overflights will be obtained every three years or as the pace of development requires. These LIDAR acquisitions will allow for future three-dimensional stream channel models to be compared to the baseline model. We hope to spatially relate changes in stream morphology to specific patterns of development, storm sewer networks, and best management practices used while this watershed undergoes development.

This project involves partnerships among the EPA, local units of government (Montgomery County Department of Environmental Protection), and local institutions of higher learning (University of Maryland, Baltimore County). The stakeholders who will realize benefits from in this project include the EPA Offices of Water and Research and Development, local units of government and private industry involved in the implementation and monitoring of best management practices to minimize the impacts of urbanization, and the general scientific community interested in the evaluation of this application of the emerging technology of LIDAR.

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